

Remarks/Arguments

The Examiner is thanked for the careful review of this Application. The Applicants submit this Amendment in response to the Office Action, dated February 20, 2004. Claims 1-10 and 16-24 are pending after entry of the present Amendment. Claims 11-15 were previously cancelled. Amendments do not introduce new subject matter.

Rejections under 35 U.S.C. § 103:

The Office has rejected claims 1-3, 5, 21-23, and 16-20 under U.S.C. 103(a), as being unpatentable over United States Patent 5,871,658 to Tao et al. (Tao) in view of United States Patent 6,228,278 to Winniczek et al. (Winniczek). In a like manner, the Office has rejected claim 4 under U.S.C. 103(a), as being unpatentable over Tao in view of Winniczek and further in view of the United States Patent 5,854,135 to Ko; claims 6-8 and 10 under U.S.C. 103(a), as being unpatentable over Ko in view of Winniczek; and claim 9 under U.S.C. 103(a), as being unpatentable over Ko in view of Winniczek and further in view of the United States Patent 5,843,815 to Liaw. The Applicants respectfully traverse the Office's rejections and submit that independent claims 1, 6, 16, and 21 are patentable over the cited references, as no combination of the cited prior art would have suggested the claimed invention to one of ordinary skill in the art.

Tao teaches a method for monitoring and controlling a plasma etch method for forming a patterned layer while Winniczek teaches a method and apparatus wherein an electrostatic chuck is used to ascertain the end of an etch process of a target layer in a plasma processing system. Ko teaches a anisotropic RIE procedure for creating a small diameter SAC opening in an insulator later in a MOSFET device while Liaw teaches a process for fabricating a MOSFET device.

The combination of Tao and Winniczek would not have taught or suggested the claimed invention, as defined in amended claims 1, 16, and 21. As amended, independent claims 1, 16, and 21 provide a method for enhancing the fabrication process of self-aligned contact structures. However, neither Tao nor Winniczek is directed at forming spacers or self-aligned contacts in a dielectric layer. Rather, both TAO and Winniczek are silent as to SAC contacts, the use of such contacts, and the fabrication of such contacts. Accordingly, the combination of TAO and Winniczek would not have motivated one of ordinary skill in the art to provide a method for enhancing the fabrication of the SAC contacts.

Furthermore, Tao specifically teaches that the second feed back control loop fed to the plasma controller controls the bias voltage between the reactor chamber and the semiconductor substrate upon the platen. See Tao, Column 7, lines 31-34. Thus, Tao expressly teaches that the bias compensation of the plasma is measured and controlled, whereas in the claimed invention, the bias compensation voltage of the plasma processing chamber is monitored. As such, one of ordinary skilled in the art reading Tao would not have been motivated to monitor the bias compensation voltage of the plasma processing chamber, as defined in the claimed invention, instead of controlling the bias compensation of the plasma. It must be noted that measuring and controlling the bias compensation of the plasma as opposed to the bias compensation voltage of the plasma processing chamber requires rather significant modifications to the apparatus. However, neither Tao nor Winniczek suggest any of such modifications. Thus, the combination of Tao and Winniczek does not raise a *prima facie* case of obviousness against the claimed invention.

In a like manner, the combination of Tao, Winniczek, and Ko would not have provided the claimed invention, as Ko fails to cure any of the deficiencies associated with the combination of Tao and Winniczek. For instance, Ko does not teach or suggest monitoring the bias compensation voltage of the plasma processing chamber. Rather, Ko uses the optical ellipsometry monitoring procedure.

The combinations of Ko and Winniczek or Ko and Winniczek further in view of Liaw also fail to raise a *prima facie* case of obviousness against the claimed invention, as defined in independent claim 6. Specifically, neither Ko nor Winniczek teaches or suggests forming source/drain diffusion regions substantially outside of the spacers formed along sidewalls of the gate structure. Ko and Winniczek further fail to teach forming an interlevel dielectric layer directly over the first surface of the substrate without forming a stop layer, as defined in the claimed invention. Ko and Winniczek also fail to teach forming of a contact hole through the ILD layer that is defined to the source/drain diffusion regions or a via hole that is defined to a top layer of the gate structure. Rather, the contact shown in Ko is formed such that the two adjacent gate structures surrounding the SAC contact are also partially covered. As such, one of ordinary skill in the art reading Ko would not have been motivated to form a via hole through the partially covered gate structures, as formation of the via holes can interfere with the process of fabricating the SAC contact or the already fabricated contacts and may adversely affect the functionality of the integrated circuit. Furthermore, formation of the

contacts on the gate structure cannot be modified, as Ko does not teach or suggest any other manner to fabricate the SAC hole.

Furthermore, Ko specifically teaches using a large area test site for reactive ion etching (RIE) end point monitoring. In particular, Ko uses the RIE endpoint monitoring of the larger area test site to monitor the RIE process of the small diameter SAC opening. Ko further teaches that the RIE procedure to be performed on the large area test site is accurately monitored using the optical ellipsometry procedures. Thus, it is respectfully submitted that one of ordinary skill in the art reading the teachings of Ko would not have arrived at the claimed invention, as formation of the SAC hole of Ko is dependent on the presence of the large area test site. Furthermore, one of ordinary skill in the art reading the teachings of Ko would not have been motivated to replace the optical ellipsometry monitoring procedure taught in Ko with an electrostatic chuck bias compensation voltage, as defined in the claimed invention. Again, such modifications require rather significant changes to the apparatus of Ko, which the art does not teach or suggest. Furthermore, there is no suggestion or motivation in Ko or Winniczek to use a different form of endpoint monitoring and detection.

As to the use of the ILD layer taught in Liaw, the Applicants draw the Office's attention to the fact that the ILD taught in Liaw is formed over a silicon oxide layer 10, and not directly over the substrate surface. Furthermore, the silicon oxide layer 10 as shown in Liaw, is also present like the silicon oxide layer 10 in Ko. As Liaw forms the silicon oxide layer 10 directly over the substrate surface, one of ordinary skill in the art would not have disregarded the teachings of Liaw wherein the ILD layer is formed over the silicon oxide layer 10, and replace the oxide layer 10 with the ILD layer. Rather, as taught explicitly in Liaw, the ILD would be formed directly over the silicon oxide layer 10.

Further, Liaw does not indicate that forming the composite interlevel dielectric results in a smooth topology. Rather, Liaw applies a temperature cycle between about 750 to 900 celosias so as to cause the BPTEOS (one of the layers of the interlevel dielectric taught in Liaw) to reflow, resulting in a smooth topology of the composite interlevel dielectric layer. Thus, it is applying the temperature that ultimately causes the interlevel dielectric layer to be smooth and not, just formation of the ILD layer. As a result, one of ordinary skill in the art reading the teachings of Liaw would not have been motivated to directly form the ILD over the substrate surface as without applying high enough temperature to the BPTEOS, the topology of the ILD layer over the substrate surface may not have been smooth.

Therefore, it is respectfully submitted that independent claims 1, 6, 16, and 21 are patentable under 35 U.S.C. § 103(a) over the cited prior art. In a like manner, dependent claims 2-5, 7-10, 17-20, and 22-24 which incorporate each and every element of the applicable independent claim are patentable under 35 U.S.C. § 103(a) the cited prior art for at least the same reasons discussed above.

In view of the foregoing, the Applicants respectfully submit that all of the pending claims 1-10 and 16-24 are in condition for allowance. Accordingly, a Notice of Allowance is respectfully requested. If the Examiner has any questions concerning the present Preliminary Amendment, the Examiner is kindly requested to contact the undersigned at (408) 749-6900, ext. 6913. If any additional fees are due in connection with filing this Amendment, the Commissioner is also authorized to charge Deposit Account No. 50-0805 (Order No. LAM2P258). A duplicate copy of the transmittal is enclosed for this purpose.

Respectfully submitted,
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